

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A method for extracting a face position, comprising the steps of:

preparing digital data of a value of each pixel within an object image region including a region of a human face; and

extracting in said object image region a position of a Between-the-Eyes candidate point ~~through a~~ by scanning and filtering process with a Between-the-Eyes detecting filter in which six rectangles are connected[[;]], wherein

said Between-the-Eyes detecting filter has a width which is substantially as long as the width of the face,

said six rectangles are arranged in two in a horizontal direction x three in a vertical direction, and

when S_{ij} ($1 \leq i \leq 2$, $1 \leq j \leq 3$) represents an average value of brightness of pixels in each of said rectangles, said scanning and filtering process extracts pixels satisfying the following equations,

$S_{11} < S_{12}$ and $S_{11} < S_{21}$

$S_{13} < S_{12}$ and $S_{13} < S_{23}$; and

extracting a portion of said object image in a prescribed size which has the extracted position of said Between-the-Eyes candidate point at a center, and selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a pattern discriminating process.

2. (Original) The method for extracting a face position according to claim 1, wherein said Between-the-Eyes detecting filter is one rectangle divided into six segments.

3. (Original) The method for extracting a face position according to claim 1, wherein said six rectangles includes
two first rectangles adjacent to each other in a vertical direction,
two second rectangles displaced relative to said first rectangles by a prescribed amount in said vertical direction, and adjacent to each other in said vertical direction, and
two third rectangles displaced relative to said second rectangles by a prescribed amount in said vertical direction, and adjacent to each other in said vertical direction.

4. (Original) The method for extracting a face position according to claim 1, wherein said step of selecting a true candidate point includes steps of
detecting positions of eyes through a pattern discriminating process with respect to said object image that corresponds to prescribed two rectangles among rectangles forming said Between-the-Eyes detecting filter,
correcting the position of said Between-the-Eyes candidate point to a middle point between two eyes based on said detected positions of the eyes,
rotating an input image around said corrected position of Between-the-Eyes candidate point such that the two eyes are aligned horizontally, and
extracting from said rotated input image a portion of said object image in a prescribed size which has the corrected position of said Between-the-Eyes candidate point at a center,

and selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a pattern discriminating process.

5. (Original) The method for extracting a face position according to claim 1, wherein said step of preparing digital data includes a step of preparing said object image as a stereo image, and said step of selecting a true candidate point includes a step of selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a distance to said Between-the-Eyes candidate point from an observation point that is detected based on said stereo image.

6. (Currently Amended) A ~~program-product~~ computer readable medium storing a program for causing a computer to execute a method for extracting a face position within an object image region, said program ~~product~~ causing said computer to execute the steps of:
preparing digital data of a value of each pixel within an object image region including a region of a human face; and
extracting in said object image region a position of a Between-the-Eyes candidate point through a by scanning and filtering process with a Between-the-Eyes detecting filter in which six rectangles are connected[[;]], wherein
said Between-the-Eyes detecting filter has a width which is substantially as long as the width of the face,
said six rectangles are arranged in two in a horizontal direction by three in a vertical direction, and

when S_{ij} ($1 \leq i \leq 2$, $1 \leq j \leq 3$) represents an average value of brightness of pixels in each of said rectangles, said scanning and filtering process extracts pixels satisfying the following equations,

$$S_{11} < S_{12} \text{ and } S_{11} < S_{21}$$

$$S_{13} < S_{12} \text{ and } S_{13} < S_{23}; \text{ and}$$

extracting a portion of said object image in a prescribed size which has the extracted position of said Between-the-Eyes candidate point at a center, and selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a pattern discriminating process.

7. (Currently Amended) The computer readable medium ~~program-product~~ according to claim 6, wherein

said Between-the-Eyes detecting filter is one rectangle divided into six segments.

8. (Currently Amended) The computer readable medium ~~program-product~~ according to claim 6, wherein

said six rectangles includes

two first rectangles adjacent to each other in a vertical direction,

two second rectangles displaced relative to said first rectangles by a prescribed amount in said vertical direction, and adjacent to each other in said vertical direction, and

two third rectangles displaced relative to said second rectangles by a prescribed amount in said vertical direction, and adjacent to each other in said vertical direction.

9. (Currently Amended) The computer readable medium ~~program-product~~ according to claim 6, wherein

said step of selecting a true candidate point includes steps of

detecting positions of eyes through a pattern discriminating process with respect to said object image that corresponds to prescribed two rectangles among rectangles forming said Between-the-Eyes detecting filter,

correcting the position of said Between-the-Eyes candidate point to a middle point between two eyes based on said detected positions of the eyes,

rotating an input image around said corrected position of Between-the-Eyes candidate point such that the two eyes are aligned horizontally, and

extracting from said rotated input image a portion of said object image in a prescribed size which has the corrected position of said Between-the-Eyes candidate point at a center, and selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a pattern discriminating process.

10. (Currently Amended) The computer readable medium ~~program-product~~ according to claim 6, wherein

said step of preparing digital data includes a step of

preparing said object image as a stereo image, and

said step of selecting a true candidate point includes a step of

selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a distance to said Between-the-Eyes candidate point from an observation point that is detected based on said stereo image.

11. (Currently Amended) An apparatus for extracting a face position, comprising:
an imaging unit preparing digital data of a value of each pixel within an object image region including a region of a human face; and

an extracting unit extracting in said object image region a position of a Between-the-Eyes candidate point ~~through a~~ by scanning and filtering process with a Between-the-Eyes detecting filter in which six rectangles are connected[[:]], wherein

said Between-the-Eyes detecting filter has a width which is substantially as long as the width of the face,

said six rectangles are arranged in two in a horizontal direction by three in a vertical direction and

when S_{ij} ($1 \leq i \leq 2$, $1 \leq j \leq 3$) represents an average value of brightness of pixels in each of said rectangles, said scanning and filtering process extracts pixels satisfying the following equations,

$$S_{11} < S_{12} \text{ and } S_{11} < S_{21}$$

$$S_{13} < S_{12} \text{ and } S_{13} < S_{23}; \text{ and}$$

a selecting unit extracting a portion of said object image in a prescribed size which has the extracted position of said Between-the-Eyes candidate point at a center, and selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a pattern discriminating process.

12. (Original) The apparatus for extracting a face position according to claim 11, wherein

said Between-the-Eyes detecting filter is one rectangle divided into six segments.

13. (Original) The apparatus for extracting a face position according to claim 11, wherein

said six rectangles includes

two first rectangles adjacent to each other in a vertical direction,

two second rectangles displaced relative to said first rectangles by a prescribed amount in said vertical direction, and adjacent to each other in said vertical direction, and

two third rectangles displaced relative to said second rectangles by a prescribed amount in said vertical direction, and adjacent to each other in said vertical direction.

14. (Original) The apparatus for extracting a face position according to claim 11, wherein

said selecting unit includes

an eye detecting unit detecting positions of eyes through a pattern discriminating process with respect to said object image that corresponds to prescribed two rectangles among rectangles forming said Between-the-Eyes detecting filter,

a correcting unit correcting the position of said Between-the-Eyes candidate point to a middle point between two eyes based on said detected positions of the eyes,

a rotating unit rotating an input image around said corrected position of Between-the-Eyes candidate point such that the two eyes are aligned horizontally, and

a discriminant process unit extracting from said rotated input image a portion of said object image in a prescribed size which has the corrected position of said Between-the-Eyes candidate point at a center, and selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a pattern discriminating process.

15. (Original) The apparatus for extracting a face position according to claim 11,
wherein

- said imaging unit includes
- a preparing unit preparing said object image as a stereo image, and
- said selecting unit includes
- a select processing unit selecting a true candidate point from said Between-the-Eyes
candidate points in accordance with a distance to said Between-the-Eyes candidate point from
an observation point that is detected based on said stereo image.